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Description

Operator control element, in particular for a multimedia system in a motor vehicle

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The invention relates to a rotary/pushbutton actuator having an annular rotary encoder which has an inner ring and a rotary ring, which can be rotated about an axis around the inner ring and has a dial, and is arranged such that it can be moved 10 linearly with respect to a housing along the axis, and having an inner part which is arranged in an interior space in the annular rotary encoder and can be moved together with the annular rotary encoder with respect to the housing linearly along the axis, it being possible to initiate a momentary- 15 contact function by linearly moving the dial and/or the inner part.

An operator control element of this type is known from DE 101 20 691 A1. This known operator control element can be 20 rotated about an axis and can be moved along this axis of rotation and can be locked in a position on this axis. A ring encoder, which has an inner ring and an outer ring which can be rotated with respect to the inner ring, is provided for the purpose of detecting the rotary movement. A touch pad which 25 enables a cursor to move on a display or allows text to be recognized may be arranged in the free interior space in the ring encoder. A joystick which detects a movement in an X-Y plane as a result of tilting and outputs corresponding electrical signals is arranged in the operator control element. 30 The joystick is also in the form of a momentary-contact switch which detects a movement of the holder as a result of the operator control element being pressed. The design of the operator control element specified in DE 101 20 691 A1 has proven to be very complicated.

The object of the invention is therefore to specify an operator control element for a multimedia or navigation system in a motor vehicle, which operator control element is of a  
5 simplified and therefore more cost-effective design.

According to the invention, the object is achieved with a rotary/pushbutton actuator of this generic type in that the rotary encoder and the inner part are arranged in a pot-like guide element which can be moved linearly along the axis, the 5 inner ring of the rotary encoder is arranged in the guide element such that it is secured in terms of rotation, the rotary encoder and the inner part are connected to the guide element such that they cannot move along the axis, and the guide element for implementing the momentary-contact function 10 acts on the momentary-contact switch.

Arranging the rotary encoder and the inner part in a movable pot-like guide element means that a momentary-contact switch on which the guide element acts can be used for the momentary- 15 contact function in a simple manner. In order to ensure that the operator control element is arranged in an extension of an armrest of a vehicle seat in an ergonomically favorable fashion, the diameter of the dial may be designed as a function of the geometry/dimensions of the touch pad, for example 20 between 40 and 100 mm. The use of the annular rotary encoder is provided in order to satisfy the requirement of integrating a further functional element, in particular a touch pad, in the inner part. The set requirement cannot be satisfied by rotary encoders with a central rotary shaft inside. The rotary encoder 25 may, in particular, be designed as a so-called ring encoder. Ring encoders of this type do not themselves have any pushbutton function in order to be able to subject a momentary- contact switch to operator control. In order to implement a pushbutton function, the assembly comprising the rotary encoder 30 and the touch pad is inserted into a pot-like guide element. This guide element is mounted in the housing such that it can move along the axis, and can operate a momentary-contact switch which is arranged beneath the guide element. A restoring force 35 is exerted on the guide element by at least one restoring element and the guide element is moved to a rest position. The use of the pot-like guide element means it is possible to

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implement a pushbutton function with different types of rotary  
encoders.

The operator control element is intended to be used in a motor vehicle for the operator control of a multimedia or navigation system in particular. In this case, a menu item can be called up, for example, by turning the operator control element and 5 then selected by pressing the operator control element. In addition, the operator control element can be used to select numbers or letters which are displayed on a display unit which is arranged separately from the operator control element. In this way, a telephone number or the name of a town or street, 10 for example, can be entered.

The touch pad can also be used to control a menu. For example, a cursor on the display unit can be moved by moving a finger over the touch pad. The menu item which is called up can then 15 be selected by pressing the operator control element. The touch pad can also be used to recognize handwritten numbers or letters which are entered. In this way, a telephone number or a name can be entered in a particularly simple manner. It is particularly advantageous when the entered letter or the 20 entered number is audibly reproduced by the device which is subjected to operator control by means of the operator control element. The driver then receives immediate confirmation about the entered symbols without having to look at the display unit and being distracted from the traffic. When used in a 25 navigation system for entering a destination, the destination location can furthermore be audibly output even after a few letters have been entered if the sequence of letters can be unambiguously associated with one single destination location. It is therefore not necessary to enter the complete name of the 30 town.

The operator control element is preferably a constituent part of an operator control unit which contains further components. Arranging the operator control unit in an extension of an 35 armrest of a driver's seat is particularly favorable in ergonomic terms. In this case, a plurality of operator control

keys is arranged, in particular, radially around the rotary/pushbutton actuator. In this case, the operator control keys may be operator control keys which

can be used to directly call up individual components, for example a telephone component or a navigation component.

5 The invention is explained in greater detail in the text which follows with reference to an exemplary embodiment and the drawing, in which:

10 figure 1 shows the mechanical design of the operator control element according to the invention, and

figure 2 shows an operator control unit with the operator control element according to the invention.

15 The operator control element has a dial 1 which is locked to the rotary ring of a rotary encoder 5 by means of a spacer ring 6. The rotary encoder 5 is a ring encoder which has a rotary ring which can be rotated about an inner ring. Ring encoders of this type are known per se. Therefore, the inner ring and the rotary ring have not been illustrated in the drawing. Rotation 20 is transmitted to the rotary ring of the rotary encoder 5 by turning the dial 1 about the Z-axis.

25 A holding cylinder 4 is pressed into the stationary inner region of the rotary encoder 5 by means of centering webs. A touch pad 2 which is secured by a retaining ring 3 is arranged in the upper region of the holding cylinder 4. This arrangement determines the position of the touch pad, with the touch pad 2 not moving with the dial 1 when said dial is turned. The use of an annular rotary encoder 5 ensures the required free interior 30 space 12 for arranging the touch pad 2.

35 The dial 1 with the spacer ring 6, and the touch pad 2 with the holding cylinder 4 and the retaining ring 3 are fitted on the rotary encoder 5 and form an assembly together with said rotary encoder.

The rotary encoder 5 is screwed into a pot-like guide element 7. The guide element 7 is guided in a housing 11 by means of a cylindrical holder. The entire assembly can therefore be moved in the Z-direction. The guide element 7 is secured in terms of 5 rotation about the Z-axis with respect to the housing. A printed circuit board 8 which is screwed to the housing 11 is arranged beneath the guide element 7. A momentary-contact switch 9 is fitted in the center of the printed circuit board 8. The guide element 7 with the abovementioned assembly 10 therefore functions in the manner of a simple rotary knob which acts on the momentary-contact switch 9. The entire assembly is pressed in the Z-direction to a zero position against a housing stop by means of a restoring element 10 between the printed circuit board 8 and the guide element 7.

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When force is exerted on the dial 1 or the touch pad 2 in the negative Z-direction, the entire assembly which is arranged in the guide element 7 moves in the negative Z-direction toward the momentary-contact switch 9 and acts on the latter. In this 20 case, the force of the restoring element 10 is overcome and the momentary-contact switch 9 executes a switching operation. After force is exerted, the guide element 7 is again returned to its initial position by the force of the restoring element 10.

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The operator controller can therefore execute the following movements of the operator control element:

- a move in the negative Z-direction as a result of being 30 pressed,
- automatic return in the Z-direction on account of restoring element 10,

35 - continuous rotation through 360° about the Z-axis.

During these movements of the operator control element, the touch pad is also moved in the Z-direction, whereas the touch pad does not move when said operator control element is rotated about the Z-axis.

- 5 Figure 2 shows the arrangement of a rotary/pushbutton actuator 13 according to the invention in an operator control unit 15 which, in addition to the rotary/pushbutton actuator 13, has further operator control keys 14 which

are arranged radially around the rotary/pushbutton actuator 13. The rotary/pushbutton actuator 13 has a diameter of 40 to 100 mm, so that a driver can comfortably grasp it by hand. When a hand is positioned on the rotary/pushbutton actuator, 5 the driver's fingers can reach the radially arranged operator control keys 14 in an ergonomically favorable manner.